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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/466,864	12/17/1999	PRADEEP S. SINDHU	JNP-0014	1675

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EXAMINER

TON, DANG T

ART UNIT	PAPER NUMBER
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2666

DATE MAILED: 07/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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**Office Action Summary**

Application No.

09/466,864

Applicant(s)

SINDHU ET AL.

Examiner

DANG T TON

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 December 1999.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 24-33 is/are allowed.
- 6) ☒ Claim(s) 1-15, 18-23, and 34 is/are rejected.
- 7) ☒ Claim(s) 16 and 17 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>4 and 10</u> . | 6) <input type="checkbox"/> Other: _____  |

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1. Claims 1-23 are objected to under 37 C.F.R. 1.75 because of the following formalities:

In claim 1 lines 4,6,7,and 11, " trie" should be changed to --- tree ---. Similar problem exists in claims 3,6,7,8,9,10,11,18,19,20, and 21.

Claims 2,4-5,12-17, and 22-23 are objected since they depend from claim 1,11, or 21.

2. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1-15 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-9,15-21, and 24-29 of U.S. Patent No. 5,909,440. Although the conflicting claims are not identical, they are not patentably distinct from each other because the following:

For claims 1-15 and 18-23, the claims 1-9,15-21, and 24-29 of patent number 5,909,440 disclose a method/ system of looking up a key associated with a packet to determine a route through a routing device comprising:

upon receipt of the key, forward traversing one or more nodes which make up a tree stored in a memory by evaluating at each node traversed a bit in the key as indicated by a bit-to-test indicator associated with each node, a value of the bit in the key determining a path traversed along the tree;

locating an end node in the tree, the end node having a route;

comparing the route to the key;

if they match, outputting destination information associated with the end node to guide the transfer of the packet through the routing device; and

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if they do not match, traversing the tree backwards to locate a best match for the key (see claim 1, column 16 lines 43-59);

wherein the step of forward traversing includes storing on a stack for each node having an attached route the bit-to-test indicator and a pointer to the attached route (see claim 2, column 16 lines 60-63);

wherein the step of traversing the tree backwards includes:

comparing the key with the route to determine a first dissimilar bit location;

popping entries off the stack to determine when the bit-to-test indicator associated with a first node in the backward traversal is less than or equal to the first dissimilar bit location; and

outputting destination information associated with the first node to guide the transfer of the packet through the routing device (see claim 3, column 16 line 64 through column 17 line 7);

wherein the first node includes a route, the method further including calculating statistical information for each packet

and storing in memory the statistical information with the route associated with each of the end node and the first node (see claim 4, column 17 lines 8-12);

including transferring the statistical information along with the destination information to an output port in the routing device for transfer to a destination (see claim 5, column 17 lines 13-16);

including the step of prior to a forward traversal of the tree, searching a root table for a match of a predetermined number of bits in the key, the root table indexed by the predetermined number of bits where each entry includes a pointer to a start node in the tree to begin the forward traversal (see claim 6 , column 17 lines 17-22);

wherein the forward traversal of the tree includes loading node information for each node traversed in the tree until the end node is reached, the node information including a bit-to-test indicator, a left child pointer, a right child pointer and an attached route (see claim 7, column 17 lines 23-27);

the nodes in the tree include left child pointers and right child pointers, each pointer including a bit-to-test indicator and an address in the memory where the child node is stored, the

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bit-to-test indicator indicating a bit to be tested in the key associated with a child node to which the left or right child pointer indicates, and where the forward traversal includes testing a bit indicated by the bit-to-test indicator associated with a child pointer and retrieving an appropriate child pointer associated with the child node that indicates a next node in the tree to be traversed after the child node, whereby accesses to the memory are minimized in the forward traversal of the tree by loading a single pointer at each node until the end node is reached (see claim 8, column 17 lines 28-41);

routing a packet through a switch comprising:

upon receipt of the packet, extracting a key from the packet;

forward traversing a tree by evaluating at each node a bit in the key as indicated by a bit-to-test indicator associated with each node, a value of the bit in the key located at a position indicated by the bit-to-test indicator determining a path traversed along the tree at each node;

locating an end node in the tree, the end node having a route;

comparing the route to the key;

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if they match, retrieving destination information associated with the end node;

if they do not match, traversing the tree backwards to locate a best match for the key having a route and destination information associated therewith; and

routing the packet through the switch according to the destination information (see claim 9, column 17 lines 42-61);

of inserting a route in a route table where the route table is stored as a tree in a memory of a routing device, the route table defining a path by which a packet is transferred through the routing device, the method comprising:

traversing the tree to determine an insertion point;

creating a new node;

determining if the insertion point for the new node is between existing nodes in the tree;

if so, setting a child pointer in the new node to indicate a node directly beneath the insertion point;

storing the new node in the memory; and

updating the child pointer in a node directly above the insertion point to indicate a starting address in the memory for the new node (see claim 15, column 18 lines 10-25);

routing packets in a packet switched network comprising:



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one or more input ports for receiving packets;

a packet memory;

an input switch coupled to each input port and the memory, the input switch including a transfer engine for transferring packets from an input port to the packet memory and a key extraction engine for extracting a key from each packet;

a controller coupled to the input switch, the controller including a key look-up engine and a route memory, the route memory for storing a route table where the route table includes a tree, the key look-up engine traversing the tree to determine a best match to the key, and upon determining the best match for the key, generating notification information;

one or more output ports;

an output switch coupled to the controller, the packet memory and the output port for transferring packets from packet memory to an appropriate output port based on the notification information received from the controller (see claim 16, column 18 lines 26-48);

where the key look-up engine includes a forward traversal engine for forward traversing the tree including evaluating at each node traversed a bit in the key as indicated by a bit-to-test indicator associated with each node,

where a value of the bit in the key determines the path traversed along the tree,

locating an end node having a route,

comparing the route to the key,

if they match, outputting destination information associated with the end node to guide transfer of a packet through the routing device, and

if they do not match, traversing the tree backwards to locate a best match for the key (see claim 17, column 18 lines 49-63);

including a stack and where the forward traversal engine stores on the stack a bit-to-test indicator for the node and a pointer to the attached route for each node having an attached route (see claim 18, column 18 lines 64-67);

where the key look-up engine includes a backward traversal engine for comparing the key with the route to determine a first dissimilar bit location, popping entries off the stack to determine when a bit-to-test indicator associated with a first node in the backward traversal is less than or equal to the first dissimilar bit location, and outputting destination information associated with the first node to guide a transfer of a packet through the router (see claim 19, column 19 lines 1-9);

including a statistical engine for calculating statistical information for each data packet and outputting the statistical information with destination information for transfer to a destination port (see claim 20, column 19 lines 10-13);

where the route memory is divided into a plurality of banks, and where parent and children nodes in the tree are stored in different banks (see claim 21, column 19 lines 14-16);

locating a best match for a key in a route table, the route table including a tree stored in a memory associated with a routing device, the tree including one or more entries defining a path through a routing device for transferring a packet in a packet switched network from a source to a destination, the route look-up engine comprising:

a stack for storing stack entries including a bit-to-test indicator and a pointer to the destination; and

a look-up engine including a buffer, a bit comparison engine and a key comparison engine, the buffer for storing node information that is retrieved from the memory, the node information including a bit-to-test indicator,

wherein responsive to receiving the key associated with a packet, the look-up engine forward traverses the tree, the bit comparison engine evaluating at each node traversed a bit in the

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key as indicated by a bit-to-test indicator associated with each node, a value of the bit in the key determining the path traversed along the tree, the look-up engine storing stack entries on the stack for each node traversed having an attached route, the look-up engine locating an end node having a route, the key comparison engine performing a singular key comparison for each packet routed through the routing device by comparing the key with the route, if they match, the look-up engine outputting destination information associated with the end node to guide the transfer of the packet through the routing device and if they do not match, the look-up engine traverses the tree backwards popping entries off the stack to locate a best match for the key and destination information associated therewith (see claim 24, column 19 line 29 through column 20 line 4);

a computer-readable medium, comprising instructions for causing a computer to:

upon receipt of a key, forward traverse a tree stored in a memory by evaluating at each node traversed a bit in the key as indicated by a bit-to-test indicator associated with each node, a value of the bit in the key determining a path traversed along the tree;

locate an end node in the tree, the end node having a route;  
compare the route to the key;  
if they match, output destination information associated  
with the end node to guide a transfer of a packet through a  
routing device; and  
if they do not match, traverse the tree backwards to locate  
a best match for the key and destination information associated  
therewith (see claim 25, column 20 lines 5-21);  
wherein the forward traverse includes instructions to cause  
the computer to:  
store on a stack for each node having an attached route the  
bit-to-test indicator for the node and a pointer to the attached  
route (see claim 26, column 20 lines 22-28);  
wherein the backward traverse includes instructions to cause  
the computer to:  
compare the key with the route to determine a first  
dissimilar bit location;  
pop entries off the stack to determine when the bit-to-test  
indicator associated with a first node in the backward traversal  
is less than or equal to the first dissimilar bit location; and  
output destination information associated with the first  
node to guide a transfer of the packet through the routing  
device (see claim 27, column 20 lines 28-40);

wherein the tree is a modified radix tree (see claim 28, column 20 lines 41-42); and

where the nodes in the modified radix tree include left child pointers and right child pointers, each pointer including a bit-to-test indicator and an address in the memory where the child node is stored, the bit-to-test indicator indicating a bit to be tested in the key associated with a child node to which the left or right child pointer indicates, and where the forward traversal includes testing a bit indicated by the bit-to-test indicator associated with a child pointer and retrieving an appropriate child pointer associated with the child node that indicates a next node in the tree to be traversed after the child node, whereby accesses to the memory are minimized in the forward traversal of the modified radix trie by loading a single pointer at each node until the end node is reached (see claim 29, column 20 lines 43-56).

For claims 1-15 and 18-23, the claims 1-9,15-21, and 24-29 of the patent number 5,909,440 disclose all the subject matter of the claimed invention with the exception of using once or more bits, a bits to test indicator, an associated node and once or more attached routes in a communications network (the claims 1-9,15-21, and 24-29 of the patent number 5,909,440 do teach using a bit, a bit to test indicator, the existing node, and

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the attached route). However, it is well-known the each node being traversed once or more bits in the key as indicated by a bits to test indicator and determining if the insertion point having the associated parent node in the tree . Thus, it would have been obvious to the person of ordinary skill in the art at the time of the invention to replace the bit, the bit to test indicator, the existing node, and the attached route as taught by the claims 1-9,15-21, and 24-29 of the patent number 5,909,440 with the once or more bits, the bits to test indicator, the associated node, and the once or more attached routes. The motivation for using the once or more bits, the bits to test indicator, the associated node, and the once or more attached routes in the claims of the patent being that it provides a need for a simple and effective technique for switching the data packets through the network.

Applicant's claim 10 merely broaden the scope of patent number 5,909,440 claim 15 by eliminating the terms "creating a new node "from claim 15 of the patent. It has been held that the omission of an element and its function is an obvious expedient if the remaining elements perform the same function as before. In re karlson, 136 USPQ 184 (CCPA). Also note Ex Parte Raine, 168 USPQ 375 (bd. App. 1969); omission of a

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reference element whose function is not need would be obvious to one skilled in the art.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



Claim 34 rejected under 35 U.S.C. 103(a) as being unpatentable over Kuwahara et al. (4,947,388) in view of Nagami et al. (5,835,710).

For claim 34, Kuwahara et al. disclose a method comprising :

defining a data path in the ATM switch comprising a path through the switch along which the data portion of the data packet travels (see data path 32 in figure 3);

defining a control path comprising a path through the switch along which routing information from the header portion travels (see control path 24 in figure 3);

separating the data path and control path in the switch (see data path 32 and control path 24 in figure 3);

and storing the data portion in the memory while routing decisions are made on the routing information in the control path (see buffer 112 in figure 3).

For claim 34 , Kuwahara et al. disclose all the subject matter of the claimed invention with the exception a router for switching a data packet between source and destination in a communications network. Nagami et al. from the same or similar fields of endeavor teaches a provision of the router (see routers R1 to R3 in figure 1). Thus, it would have been obvious to the person of ordinary skill in the art at the time of the

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invention to use the router as taught by Nagami et al. in the communications network of Kuwahara et al. The router as taught by Nagami et al. can be implemented/modified into the network Kawahara et al. by replacing ATM switch of Kawahara et al. with the router as taught by Nagami et al. The motivation for using the router being that it performs higher layer 3 in the switching system.

6. Claims 24-33 are allowed.

7. Claims 16-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claims 16-17 also need to overcome the objection under 37 C.F.R 1.75.

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Sindhu et al. (6,493,347) is cited to show system which is considered pertinent to the claimed invention.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANG T TON whose telephone number is 703-305-4739. The examiner can normally be reached on MON-WED, 5:30 AM-6:00 PM and Thur 5:30-9:30 A.M.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, RAO SEEMA can be reached on 703-308-5463. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

D. Ton



DAN TON  
PATENT EXAMINER